Advanced Robotic Technology

# ***ART ROUTER***
# ***SX Series***
# ***Ver. 3***

# ***SERVICE MANUAL***


Advanced Robotic Technology

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***57 Trade St.***
***Lytton 4178***
***Brisbane***
***Queensland***

***www.advancedrobotic.com***
***service@advancedrobotic.com***
***Phone 617 3393 6555***
***Fax 617 3393 5355***

**Warning**
Genuine ART parts are the factory recommended replacement parts for your CNC machine. Any damage caused by the use of other than genuine ART parts may not be covered by the ART warranty.

You are responsible for the safe use of the product. Art does not and cannot make any guarantee or warranty regarding the safe use of the machine in your environment.

**General**
ART warrants that its product shall be free from defects in materials and workmanship.

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## Functional Description of Machine Operation

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## Appendix A

# RECOGNISE SAFETY INFORMATION

When you see a safety symbol on the machine, understand the potential for personal injury, and follow the related instructions to avoid the hazard.


The symbol shown in this section are use to identify potential hazards. When you see a safety symbol in this manual or on your machine, understand the potential for personal injury, and follow related instructions to avoid the hazards.

**FOLLOW SAFETY INSTRUSTIONS**

- Read the manual safety messages and safety labels on your machine carefully.
- Always keep the machine label in good and clear condition. Replace if it damage or missing.
- Learn how to operate and use the machine controls properly. Do not let anyone operate it without proper instruction or training.
- Keep machine in proper working condition. Unauthorized modifications to the machine may affect safety and machine service life.

**DANGER WARNING CAUTION**

- A single word DANGER or WARNING is used with a safety symbol. DANGER identifies the most serious hazards.
- DANGER and WARNING safety labels are located on the machine near specific hazards
- WARNING safety messages precede related instructions in this manual that may result in injury or death if not followed correctly.
- CAUTION safety message precedes related instructions in this manual that may result in damage to equipment of not followed correctly.

# ELECTRIC SHOCK CAN KILL

Touching live electrical parts can cause a fatal shock or severe burn.

Router Machine operation

- The spindle on a router uses 3 phase power at 380 volts ac. These voltages are lethal and no attempt should be made to inspect or interfere with any of the wiring. Only a qualified electrician should work on the equipment.
-

- Exposed power supply connections present a severe electrical hazard. Inspect the input power cord frequently for damage or cracking of the cover. Replace a damage power cord immediately. Bare wiring can kill.
- Before checking, cleaning or servicing machine, disconnect the main power or unplug the power supply.
- Before removing any power supply or system enclosure cover, disconnect electrical input power. Wait for 5 minutes after disconnecting the main power to allow capacitors to discharge.

## ROUTER CUTTING CAN EXPEL SWARF AT HIGH SPEED

Fire Prevention

- Ensure the area is safe before doing any cutting. Always keep a fire extinguisher nearby.
- Remove all flammables away from the CNC machine,
- Quench hot metal or allow it to cool before handling or before letting it touch combustible materials.
- Do not cut a material that has combustible substance on it.

## SOME MATERIAL CUTTING CAN PRODUCE TOXIC FUMES OR PARTICLES


- Keep the cutting area well ventilated or use the dust extractor provided from ART at all times.

-

## MOVING PARTS CAN CAUSE INJURY


- Keep hands away from the Router bit when the spindle is on.
- Keep hands away from the Tool changer carousel unless removing or replacing a tool holder.
- Router bits at high speed can cut anything instantly.
- Never clean the spindle or foot when the unit is working.

## HOT METAL SWARF CAN BURN SKIN AND EYES


- Use eye protection in accordance with applicable national or local codes.
- Wear eye protection (safety glasses or goggles with side shields.
- Routing metals can produce hot swarf.
- Protect your skin by wearing gauntlet gloves, safety shoes and hat.
- Wear long clothes to cover all exposed areas.
- Cuffless trousers to prevent entry of swarf and hot metal

# LASER SAFETY


- Laser beams can Cause retinal damage and blindness
- Never look directly into the beam of the alignment laser. Place hand under it to check if the beam is on.
-


# WARNINGS

| | |
|---|---|
|  | Electric Shock Can Kill<br>- Turn off the power and the circuit breaker on the machine. Remove the power plug to ensure the machine is fully isolated form electric power.<br>- Do not touch live electrical part! If power is require during servicing, use extreme caution while working on the machine. As a reminder, high voltage will cause injury or death.<br>- Do not attempt to repair any power board. |
|  | HOT PARTS CAN CAUSE SEVERE BURNS<br>- Allow the power supply to discharge before servicing. |
|  | MOVING BLADES CAN CASUE INJURY<br>- Keeps hand away from moving parts. |
|  | STATIC ELECTRICITY CAN DAMAGE CIRCUIT BOARDS<br>- Put on a ground wrist strap before any circuit board handling is performed. |

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# *CNC Table Specifications*

| | | |
|---|---|---|
| **POWER SUPPLY** | | |
| Max. | 250Volts AC | 50Hz |
| Max. Current | 6 Amps | |
| **MECHANICAL** | | |
| Weight | Depends on length and configuration of the machine | |
| | Approximately 1,500 Kg to 4,800 Kg | |
| Frame Size | Length | 4000mm to 21,000mm |
| | Width | 1545mm to 3365mm |
| Work Area | X | 1200mm to 2800mm |
| | Y | 3500mm to 20,000mm |
| Gantry length | | mm |
| Travel Speed | X,Y max | 24,000mm/Min |
| | Z Max | 7,500mm/Min |
| Paint Colours | Frame | Antique silver AS Powder coating |
| | Panels | Yellow /Gold powder coating |
| | Brackets | Silver |
| Computer Operating system | | Windows XP |
| | | LAN or Wireless connectivity |
| | | 15 inch Touch screen LCD Display |
| | | Serial RS422 communication with CNC table |
| Motion Control | | PMAC running G code files |

# *SECTION 2*

# Functional description of machine operation

## Power Supply

The CNC table is powered from a standard 10 amp 240 Volt AC power point.
There is a UPS (uninterruptible power supply) inside the machine which is used to filter the power for the computer and motion control electronics. It is wired so that when the isolation switch is turned off the input power and the load on the UPS is removed. The UPS is programmed to shut down after a short period under this condition.
If the mains supply should fail, the electronics will continue to operate on the UPS but it is recommended to shut the system down normally before the battery supply on the UPS fails and causes possible corruption of the operating system of the PC.

## General Functionality

The ART Plasma CNC table has at the heart of its operation a specialized motion control computer (PMAC) which is fed data files, in the form of G code, from an industrial touch screen operated PC. This communicates on Com port 1 normally.
The PC communicates with the PMAC via an RS422 serial cable running through the X cable chain of the machine.
The pendant is a serial Display/Keyboard which also communicates with the PC through its own RS422 cable directly to COM Port 2. The only connection the pendant has to the CNC table is 5 Volts DC supply interfaced at the intermediate connection on the PMAC panel.

The PMAC gathers input data from the motor encoders and various switches and sensors and sends output data to the machine's solenoids, laser, printer and other output devices via, up to 4, serial RS422 channels. These serial data channels terminate at Mini I/O PCBs. There can be up to 3 Mini I/O circuits, or 1 Mini I/O circuit plus 1 analogue circuit board at the end of each channel. Each channel must end with an analogue PCB or terminator plug for stable data, including any unused channel.

The Mini I/O PCBs have isolated 24 volt power for all inputs and outputs as these are optically isolated.
The PMAC with its 5 to 8 break-out board and expansion cards has its own 5 Volt DC supply, as it is optically isolated from the PC (by the RS422 Com. Board), the Data channels (by the serial I/O boards) and the motor PWM driver boards (by the PWM interface boards).

## Emergency Stop (E-STOP)

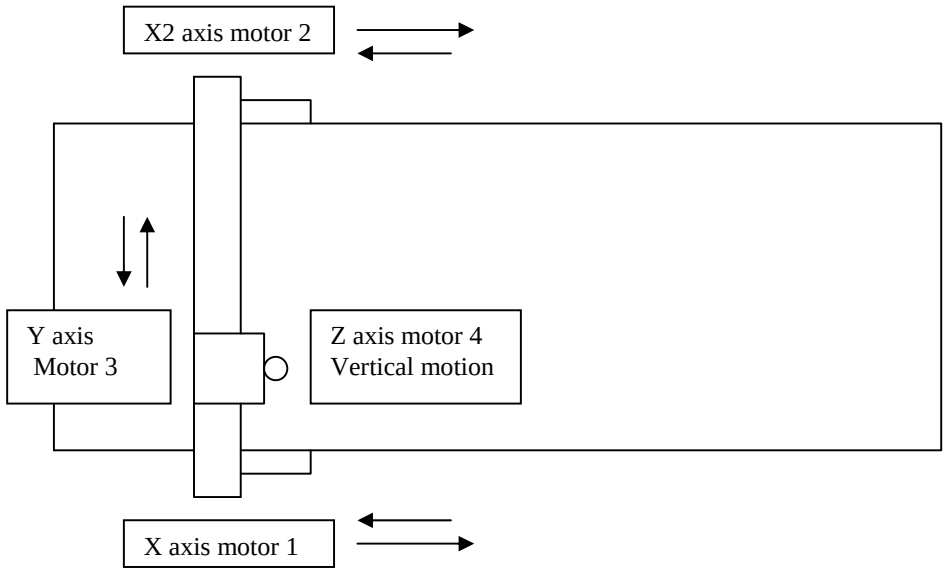
The E-Stop circuit is a completely electrically isolated from the electronic control circuits of the cnc table. This system has two interfaces to the machine.
The E-Stop circuit monitors the emergency stop buttons and light curtains (if fitted) and these inputs trigger the safety timer. After the preset time (settable on the timer module), the timer module deactivates the Motor power circuit via the isolating contactors and outputs an optically isolated signal to the channel1 Mini I/O PCB to inform the PMAC and PC that an E-Stop has occurred.

Each E-Stop button and light curtains have a separate instantaneous circuit as part of the PMAC's I/O to allow the PC to instruct an orderly shut down of the motors. If the system for any reason fails to see those signals the Safety relay will force the power off regardless. The torch break away switch is monitored directly by the PMAC only and will inform the PC of an emergency stop in that case.

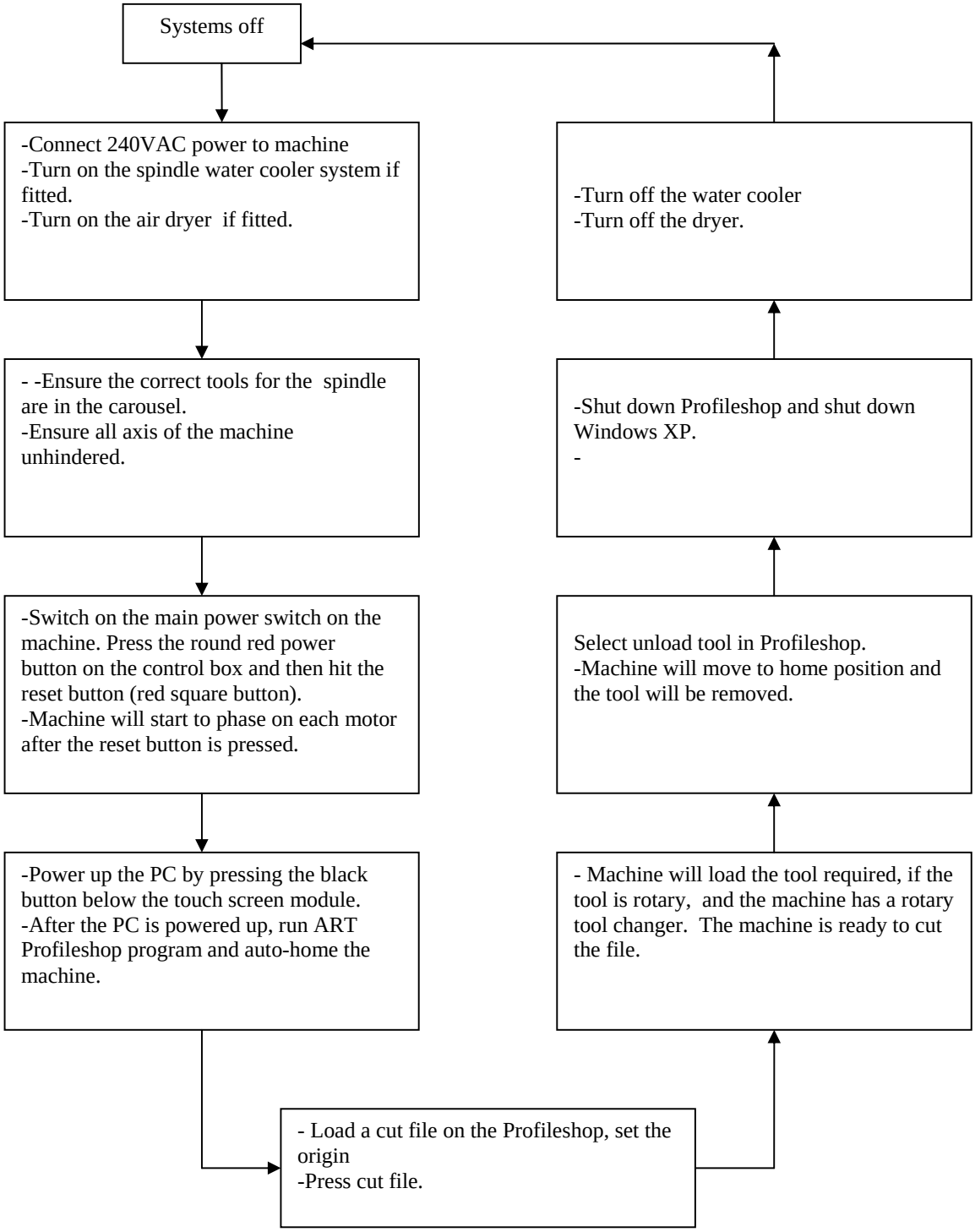
## Router Connections

The spindle is powered by a Variable Frequency Drive (VFD) unit. The VFD is connected to 3 phase AC 380 Volts. This unit supplies the spindle with the correct power requested by the cnc via a control voltage which is output from the analogue pcb on Serial I/O channel 3. The analogue board also sends a Start-Forward or Start-Reverse signal. The mechanical air driven functions such as tool eject and jaw cleaning, as well as the sensing of the tool eject button, speed sensor and the draw bar position sensors are all done on Serial data channel 2 inside the Tool head.

## Motor, axis and direction convention



# Sequence of Operation



# Troubleshooting

WARNING
This machine has LETHAL voltages at various positions inside the covers. If in doubt, consult ART or your electrician. Observe all your company safety procedures before continuing.

The complexity of the circuitry on the machine may require a qualified technician to service it at the component level.
If any unsolvable problem occurs during troubleshooting, please ring ART and speak to the technical support help desk.

Troubleshooting Procedure.

1. Electrically isolate the machine
2. Perform visual check on the machine parts where the problems occurring
3. Perform visual checks on the external and then the internal systems.
4. Check and ensure all connections on the cabling are tight.
5. Make sure that all mechanical parts look correct and move smoothly.
6. Replace faulty parts.
7. Power on the machine and test again
8. If a fault persists, please refer to Trouble shooting Chart for more information.
9. ART's service department has telephone assistance during normal office hours.

# Visual Check

1. Switch off machine main power.
2. Remove machine control box cover which located at the back of the machine's gantry (or on the end of the table frame on earlier plasma tables). Visually check all devices inside the control box, especially on the circuit boards. Ensure there is no burn or char marks, no burning smell, discolouration, lose connection etc. Replace the part if necessary.
3. Ensure no mechanical parts are loose, dismounted, broken etc. Replace or repair if necessary.
4. Perform some general cleaning if applicable, e.g. filters and covers.

# Troubleshooting Chart

**Warning: Never remove or replace cables, connectors or circuit boards while the machine is powered up. Doing so could result in serious damage to the machine or injury to personnel.**

| Problem | Symptom | Solution |
|---|---|---|
| Motor amplifier fault or fatal following error<br>Motor 1 – X1<br>Motor 2 – X2<br>Motor 3 – Y<br>Motor 4 – Z<br>Motor 5 – W<br>Motor 6 – A<br>*Fatal following error* refers to the said motor not getting to its target position according to the feedback from the encoder.<br>*Amplifier error* refers to an overload on a particular motor. | Machine stopped jogging or unable to jog properly.<br>Machine stops in the middle of an operation due to a mechanical jam or overload.<br><br>Electrical noise in the data between Mini I/O boards and Pmac due to faulty cables or bad earthing on cables | |
| | | Ensure machine is free to move by hand after all motors are disabled using the "Kill Motors" button. If not, remove machine covers and check motor gear boxes. Ensure all mechanical parts are in good condition and tensioned correctly. |
| | | Ensure all motors are free to move. Ensure all toothed racks are clean and free from swarf. Perform general cleaning as needed. |
| | | Ensure the motor encoder on the end of affected motor is not loose. Remove the encoder cover and ensure the encoder disc is sitting between the gaps of reader. If the disc is rubbing on the reader, first loosen the grub screw and reposition the disc, tighten it and re-phase the motor.<br>*To re-phase the motor, please contact ART for further assistance. |
| | | Disable the motors with the "Kills motors" button, check encoder feedback by logging in as a *technician*.<br>**Note: *Technician mode*** can only be accessed with a special code obtainable from ART Service Department, select *setup*, *executive* then click *position*.<br>Move each motor and ensure there no missing counts. Otherwise replace the encoder. Once replaced, the motor needs to be re-phased. This involves the use of 'Executive'. |
| | | Check encoder cable is not loose on the connections at both ends (at the encoder and in the relevant mini I/O box). |

| | | |
|---|---|---|
| | | Turn off the machine and swap the PWM amplifier board from another motor drive. Power on and test the machine. If the original problem has moved to that motor where the original PWM board is used, then replace the PWM board.<br>Try the same thing for the PWM interface board, then try the linking cables.<br>If an X axis motor generates a fault, check the opposite axis for broken belt or jam. It may have stopped moving, causing an overload in the opposite motor. Check limit switches.<br>Data cable problems leading out to the mini I/O boards can cause missing encoder counts. Look for loose connections in plugs or broken wires. |
| X, Y or Z stops moving while autohoming | Machine lost it home position | Check that all limit switches on every axis are in good condition and not jammed or no shorts on the terminals. Depressing the switches by hand (or activating the proximity versions with metal) will result in a yellow LED lighting up on the relevant mini I/O board. |
| Machine unable to reset Emergency Stop (E-STOP) system | Open circuit button or Fault in circuit. | Ensure all E-STOP buttons are fully released. Ensure all the E/S loops are closed by checking the E/S breakout board. Use multimeter to check the resistance on each pair of cables to ensure the resistance is close to 0 ohms. If not, check each E-STOP button terminal to ensure the cable is not loose. Replace as necessary |
| Profileshop running in demo mode | PC unable to communicate with machine. **Note**: When the computer is communicating with the machine the dot on the touch screen pendant is flashing. | Ensure touch screen keyboard is not used while executing ART profileshop program.<br>If Pewin Pro has been previously used and shut down, the process may have to be terminated by going into *Windows Task Manager (*press CNTRL + ALT + DEL). The process is called PMACSE~1.exe.<br>Check the RS422 communications cable, ensure connections are tight.<br>Measure the voltage across the red and black cables on the RS422-232 board is about 5Vdc + or – 0.1V. If not check the power supply and adjust if necessary. If yes then change the 232-422 board and reset the PC. If that is not the fault then check the RS422 board at the other end behind the Pmac panel. |

| | | |
|---|---|---|
| Tool head inactive | | Check *T/Head 1* button on the Task bar of ART Profileshop is Active (pushed in). |
| Tool fault active | | |
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| | | |
| Control PC Will Not Boot Up — No Movement | No display on screen and no fan running | Check that the power leads are plugged in and switched on.<br>Check the workshop fuse-box/safety switches.<br>Check the integrity of the data leads between the main box and the gantry.<br>Check the pendant lead, an unplugged pendant can cause the PC to freeze up.<br>Ensure that the host computer is turned on. |
| Inaccuracy in Cutting | | Select 'AUTO HOME' from the MAIN MENU/ORIGIN MENU.<br>Make sure that swarf is not restricting gantry carrier bearings or the rack and pinion gears.<br>Check that the drive gears are clean from grit.<br>Check that nothing inhibits the movement of the data chain.<br>Check that your design program is set up for the ART profile cutter. Settings can be obtained from ART service personnel. |
| Cut Is Not Square or Is Not Meeting Up | Mechanical problem | Check the drive motor gear spring tension.<br>Mark out a circle and a square on the material to check for accuracy.<br>Measure the diagonals of the square and the diameter of the circle marked out on the material. If the diagonals are out then the machine needs to have the gantry squared up. Contact ART for details of the procedure. |
| Cuts Wrong — Does Not Cut According to the File | File not correct | Check the serial cable between the control console and the ART profile cutter.<br>Check that the settings for the communication port used to send data to the machine have not been changed. Ask an ART service person. |

| | | |
|---|---|---|
| | | Ascertain whether all axes are moving normally. If not, contact an ART service person.<br>Turn off the profile cutter, leave it turned off for a minute and then turn it back on.<br>If this does not help, do the same to the touch screen PC which is sending the cut files to the machine.<br>*Note: The machine will only cut what it is directed to cut, from the file. If the file has a fault the table will respond accordingly.* |
| Machine Starts but Pendant Display or Buttons Do Not Work | | .<br>Check that the pendant is plugged in.<br>Replace the pendant lead.<br>Turn off the profile cutter, leave it turned off for a minute, and then turn it back on.<br>Reboot the Touch screen PC which is sending the cut files to the profile cutter.<br>If none of the above works, contact an ART service person. |

* For further information or troubleshooting regarding to the Hypertherm Plasma unit, please refer to the Hypertherm service manual. If there is an unsolvable problem, please fax a **Non Conformance Report** (**NCR**, of which a blank copy can be found in the back of this manual) and/or phone ART for Technical support.

# *SECTION 3*

# Maintenance

**Daily**

Clean bearing rails and racks if needed. Clean trough, remove any obstructions.

**Weekly**

Check for good earthing of the table, the earth stake may need watering in some dry installation locations

**Monthly**

Clean down machine,
Clean all linear rails. (*Do not blow air into the linear bearings*)
Clean out the dust from above the gantry bearings.
Clean trough
Remove covers from equipment fans and clean foam filters, make sure fans are operating

**Check for squareness**

Setup file of a large square 1200*1200. (Cut scrap)
Run file.
Or use the laser and mark a square with a pen on tape across the slats using measure-move. Measure diagonals, noting which diagonal is which.
If diagonals do not measure within 1mm, Call ART.

**Grease machine.**

See photo on page 2 for details
For machines with manual lubrication points, you should apply light grease to each grease nipple once per month. If your machine is in an extremely dirty environment it may be wise to increase the frequency of this process; however, you should discuss this with an ART service person before doing so.
On a standard gantry-style machine with a single head, there are normally thirteen grease points.
Lightly grease linear rail with INOX spray lubricant.

**X Axis Grease Points**

Four grease points are located on the X axis. Two of these are located at each end of the gantry along the silver guide rail: one at the front and one at the rear of each carriage mount.

**Y Axis Grease Points**

Four grease points are located on the Y axis. These are located on each side of the tool head along the silver guide rails: two on the home side and two on the offside.

**Z Axis Grease Points**

Four grease points are provided for the Z axis bearing rails. Use a flexible grease gun connection to reach the grease points positioned under the lower edge of the sliding face plate. However, on some machines the tooling does not permit access to some or all of these points. If this is the case on your machine, contact an ART service person.

**Z-Screw Grease Point**

Next to the Z bearing nipples

**Check connectors.**

Ensure all connectors are tight.

## Annually

- Ensure all structural bolts are tightened properly.
- Check shielding on all cables for damage.
- Check Tension on gearbox pinion to rack, make sure there is at least 1mm of spacing in spring tension stopper between bracket and spring tube.
- Check all drive belts for tears cracks or shredding.
- Check for any sideways movement in the mounting of the gearbox pivot bearings.
- If the machine has a chain driven trough, check the tension on a the chain and adjust as necessary and oil the chain.

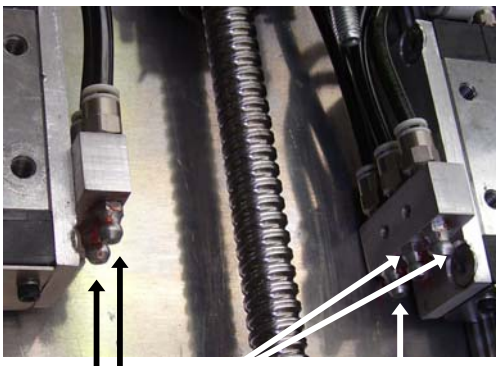
# Grease Points

X Grease Nipples

Nipples Both sides of Table

Nipples Both sides of Tool Head

Y Grease Nipples



Z Bearing Grease Nipples

Z Ball Screw Grease Nipple

Position of Z Grease nipples under tool head face plate

## Recommended Spares

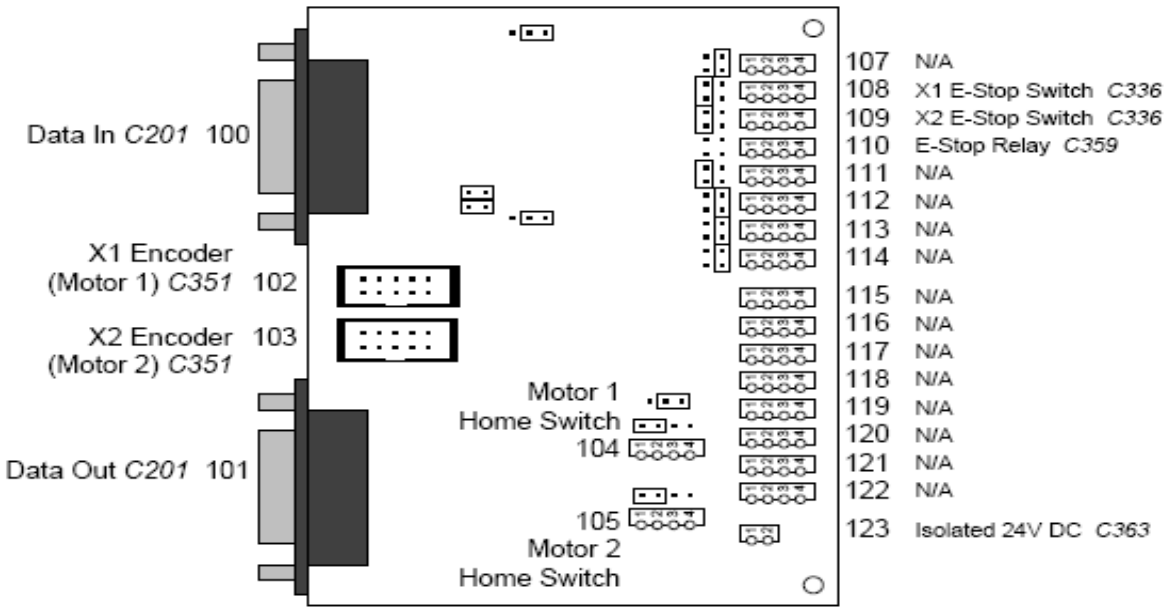
| Item | Tag/Order Number | Qty |
|---|---|---|
| PWM Amp | E439 | 2 |
| PWM Interface | E440 | 2 |
| FPGA Breakout | E436 | 1 |
| 5 - 8 Expansion | E437 | 1 |
| Serial I/O Interface | E442 | 1 |
| Mini Serial I/O | E441 | 2 |
| Control Box 232-422 | E715 | 1 |
| Touch Screen 232-422 | E716 | 1 |
| 422 Pendant Assembly | E443 | 1 |
| Analogue I/O (Router) | E438 | 1 |
| 5V PCB Mount Switchmode Power Supply | E600 | 2 |
| Servo Motor ready to install | N/A | 1 |
| Encoder | E696 | 2 |
| Limit Switch with cable | C313 | 1 |
| Control Box Power Switch | E516 | 1 |
| Control Box Reset Switch | E426 | 1 |
| Control Box Fuse 5Amp slow blow 3AG type | E498 | 5 |
| UPS Fuse 6Amp slow blow 20x5mm | Local supply | 5 |
| Touch Screen Reset Switch | C261 | 1 |
| Pendant Lead | C314 | 1 |
| YZ Data Lead @ 6440 | C315yz | 1 |
| Analogue Data Lead @14380 | C315an | 1 |
| 422 Serial Lead @26340 | C270 | 1 |
| Proximity Sensor @1000 | C308 | 1 |
| Hard Drive with Setup | N/A | 1 |
| ATX Motherboard with Memory | E477, E480 | 1 |
| X, Y Gear Box Belt (HTD 525 5M 15) | M435 | 3 |

| | | |
|---|---|---|
| Z Gearbox Belt (HTD 375 5M 15) | M436 | 1 |
| X, Y Pinion | M46 | 2 |
| X, Y Motor Pulley | M439 | 1 |
| Z Motor Pulley | M619 | 1 |
| 25mm Runner Block | M149 | 2 |
| 6200N Ballscrew Support Bearings Top | M27 | 2 |
| 3200B Ballscrew Support Bearings Bottom | M424 | 2 |

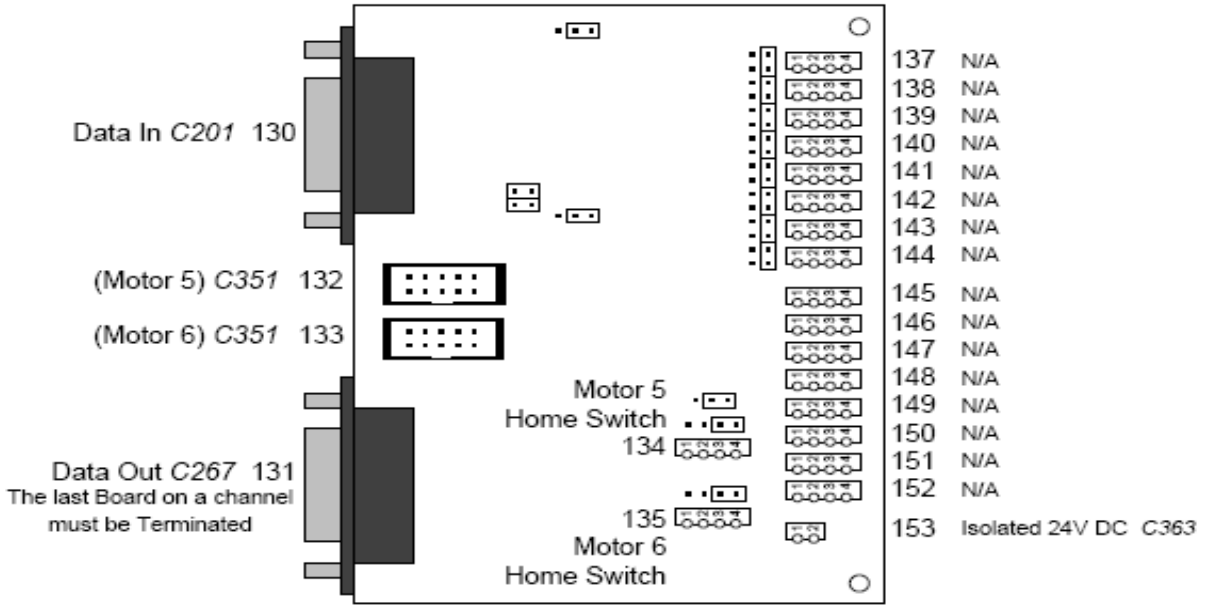
# Plasma Channel 1 - Mini Serial I/O Board Configuration

Connection and Cable Numbers

## Channel 1 Board 1 (X)




## Channel 1 Board 2

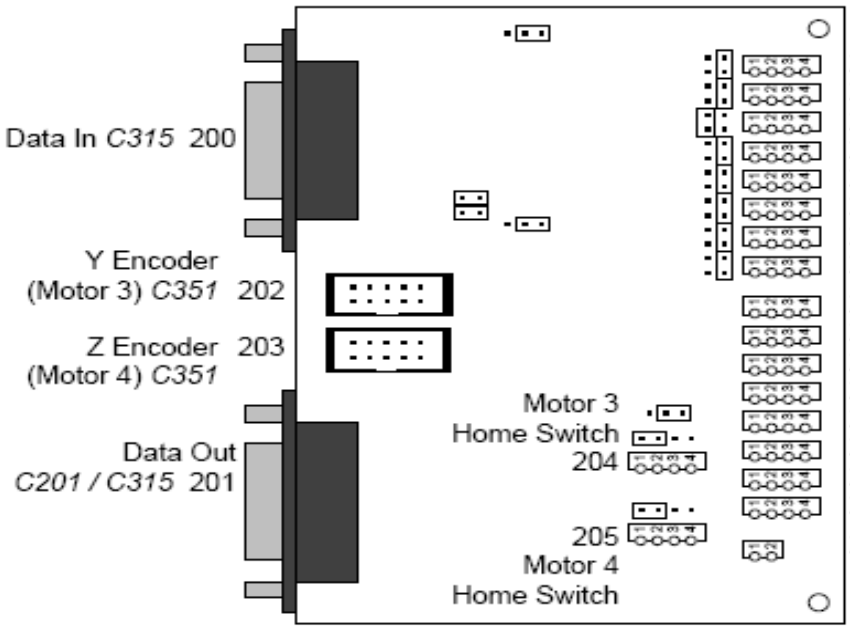



Note: Encoder Feedback and Home Switch inputs for Motors 5 and 6 will be received through Ch.1.2 if the jumpers on CN5 of the FPGA board are set 13-15. If they are set 13-11, they will be received through Ch.3.1.

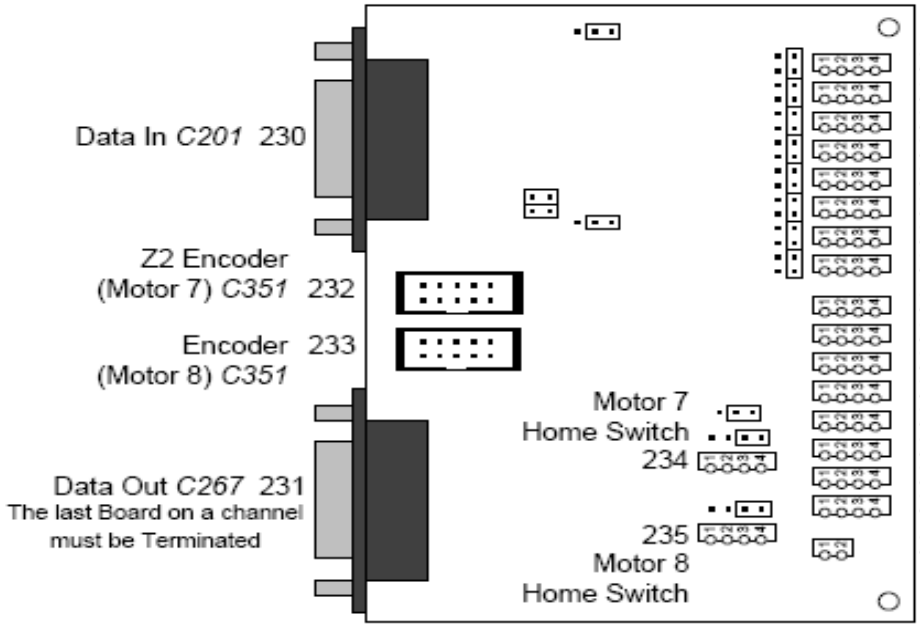
# Plasma Channel 2 - Mini Serial I/O Board Configuration

**Connection and Cable Numbers**

## Channel 2 Board 1 (YZ)




## Channel 2 Board 2

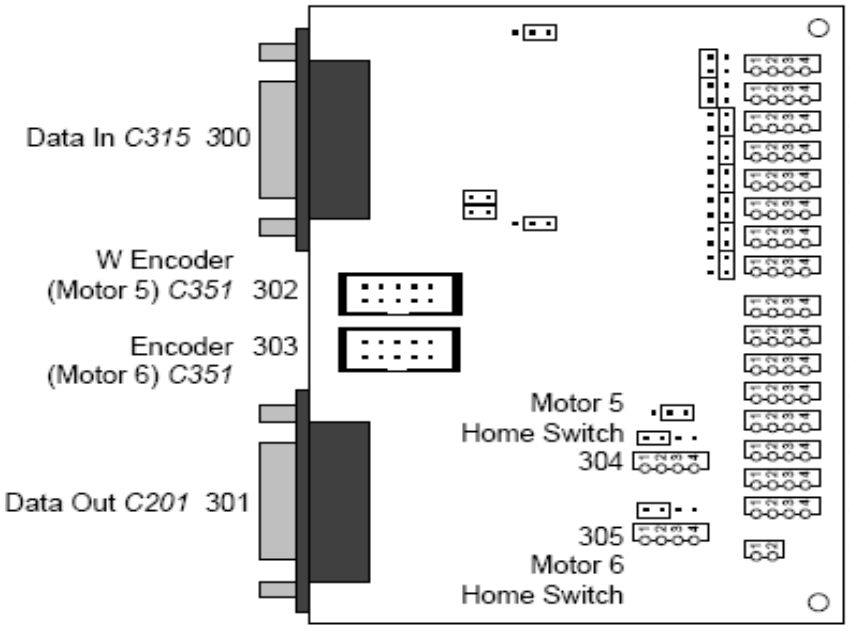



Note: Encoder Feedback and Home Switch inputs for Motors 7 and 8 will be received through Ch.2.2 if the jumpers on CN5 of the FPGA board are set 14-16. If they are set 14-12, they will be received through Ch.4.1.

# Plasma Channel 3 - Mini Serial I/O Board Configuration

Connection and Cable Numbers

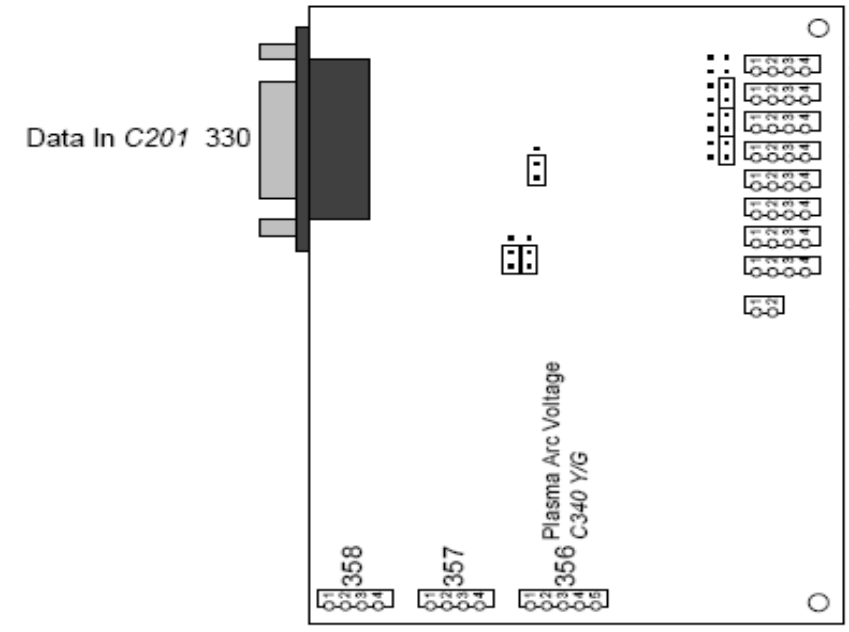
## Channel 3 Board 1




Note: Encoder Feedback and Home Switch inputs for Motors 5 and 6 will be received through Ch.3.1 if the jumpers on CN5 of the FPGA board are set 13-11. If they are set 13-15, they will be received through Ch.1.2.

* *C335* connects to *C333* (4 way joiner).
*C333* does not plug into the IO card, but is shielded to the box.

## Channel 3 Board 2 (Analogue)



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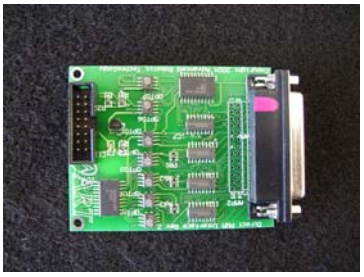
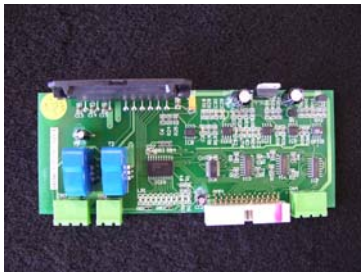
# Machine Circuit Board Images

E716 Touch Screen 232-422 Board

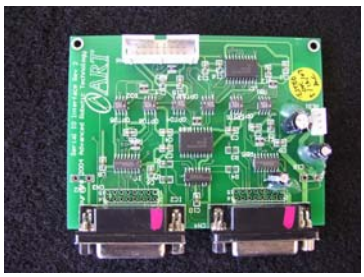


E715 Control Box 232-422 Board

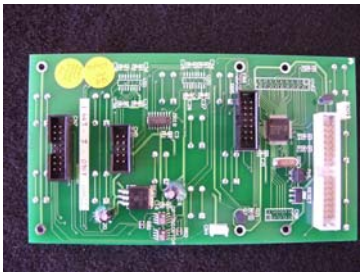


E440 PWM Interface Board

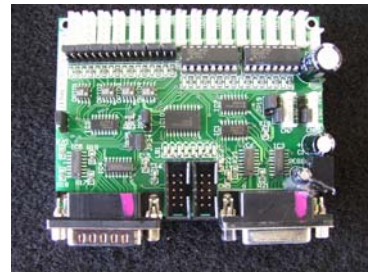
E439 PWM Amp Board



E438 Analogue Board

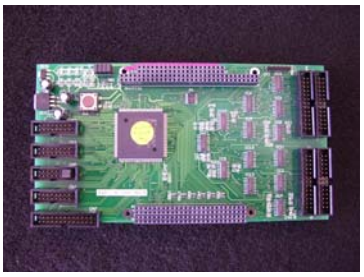


E442 Serial IO Interface Board



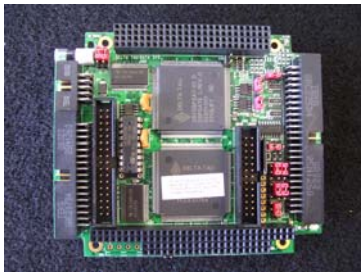
E443 Pendant Board

E441 Mini Serial IO Board

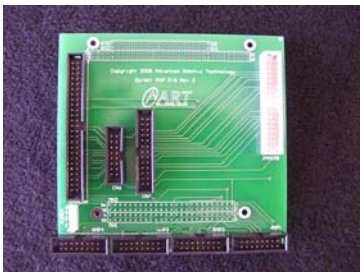


E436 FPGA Breakout Board

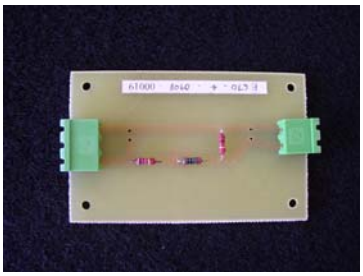
PMAC Controller



PMAC Additional Channel

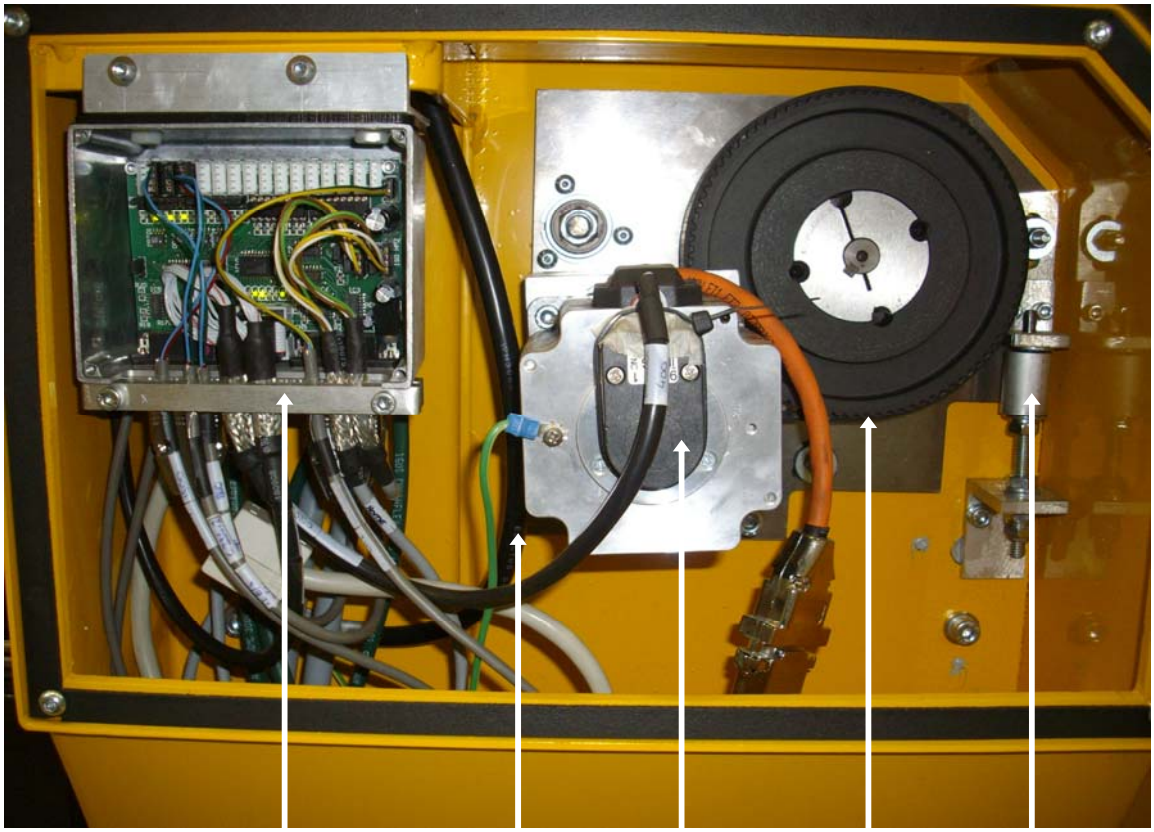


E437 5-8 Extension Board

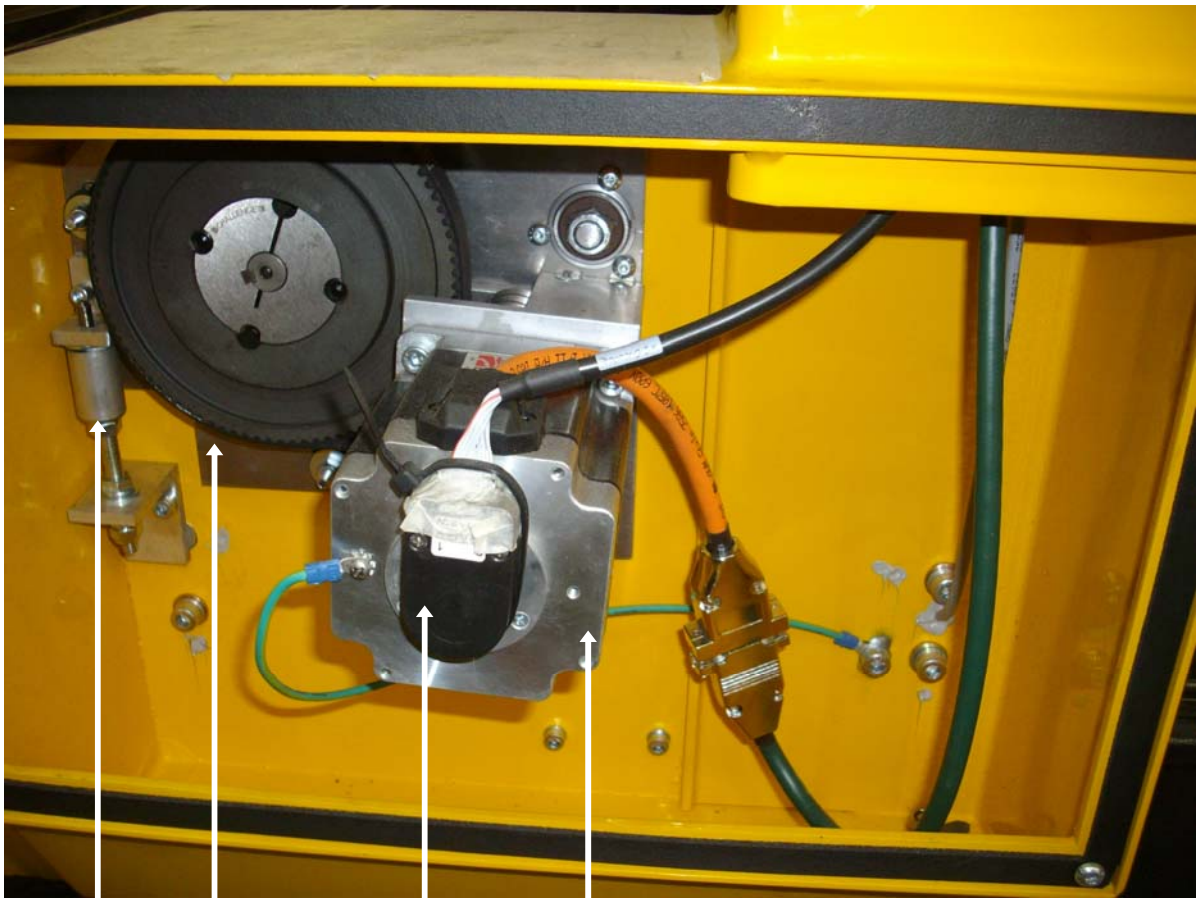


E670 Plasma Voltage Divider

# HOME SIDE X1 GEAR BOX

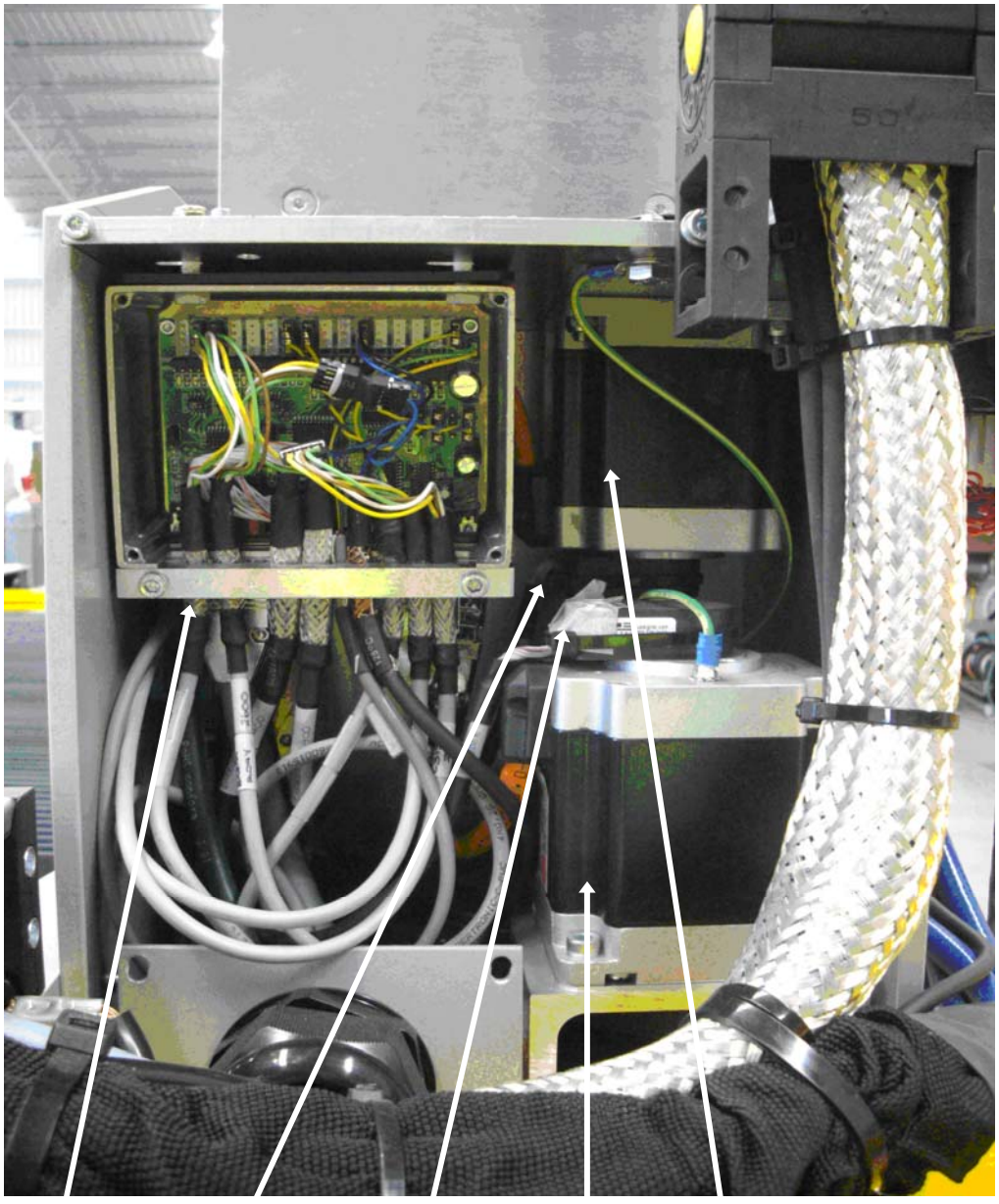


# OFF SIDE X2 GEAR BOX



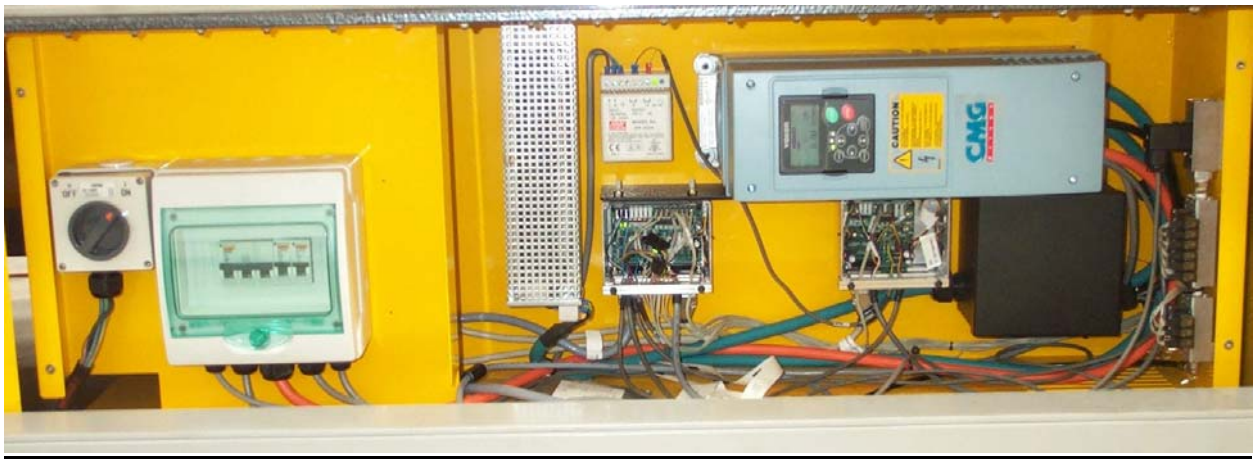
| Gear Box Tensioner | Drive Belt | Motor Encoder | Motor X2 |
|---|---|---|---|

# TOOL HEAD Y and Z GEAR BOXES



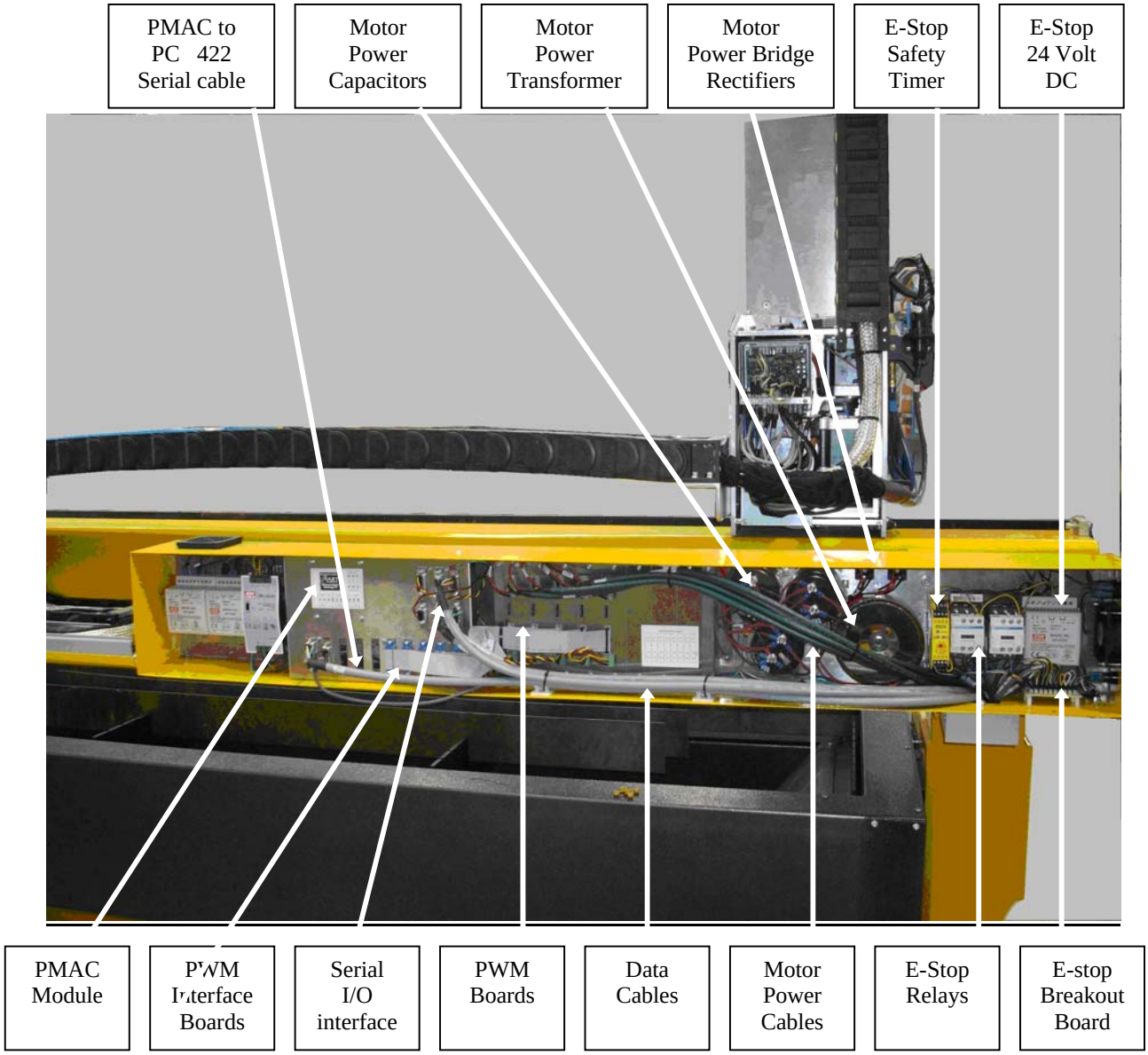
| Mini Serial I/O CH2 | Z Motor Encoder | Y Motor Encoder | Motor Y | Motor Z |
|---|---|---|---|---|

# POWER and CHANNEL 3



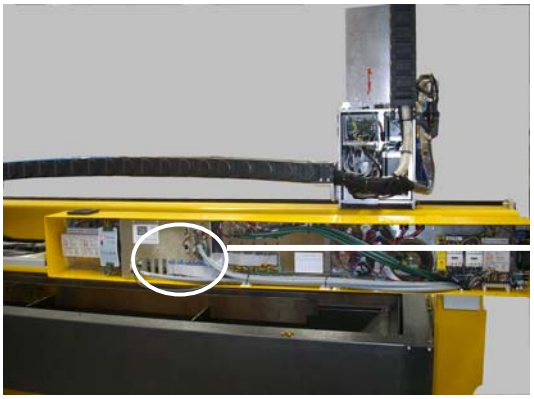

| Uninterruptable Power Supply | Mini Serial IO CH3 | Analogue Board | Control Box |
|---|---|---|---|

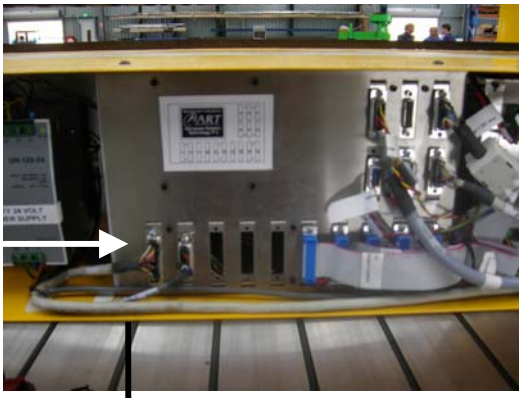
# CONTROL BOX

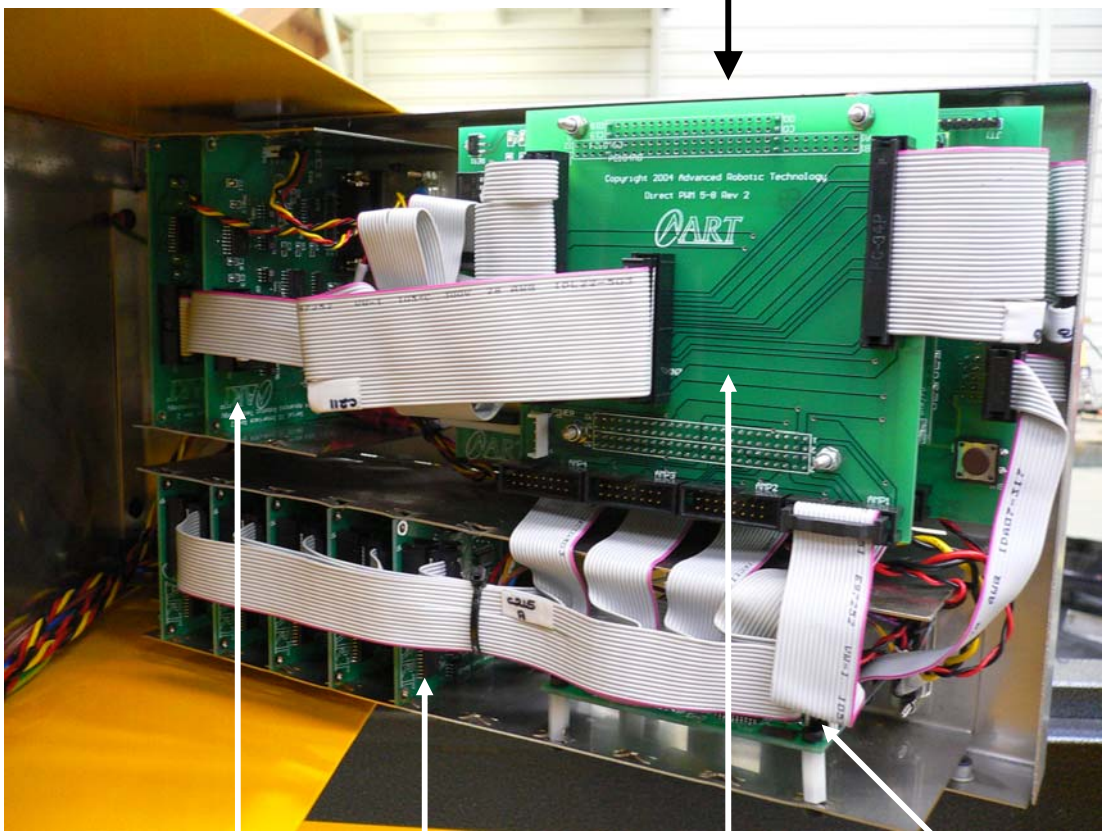

PMAC to PC 422 Serial cable
Motor Power Capacitors
Motor Power Transformer
Motor Power Bridge Rectifiers
E-Stop Safety Timer
E-Stop 24 Volt DC
PMAC Module
PWM Interface Boards
Serial I/O interface
PWM Boards
Data Cables
Motor Power Cables
E-Stop Relays
E-stop Breakout Board

# CONTROL BOX POWER SUPPLIES

# PMAC MODULE REAR

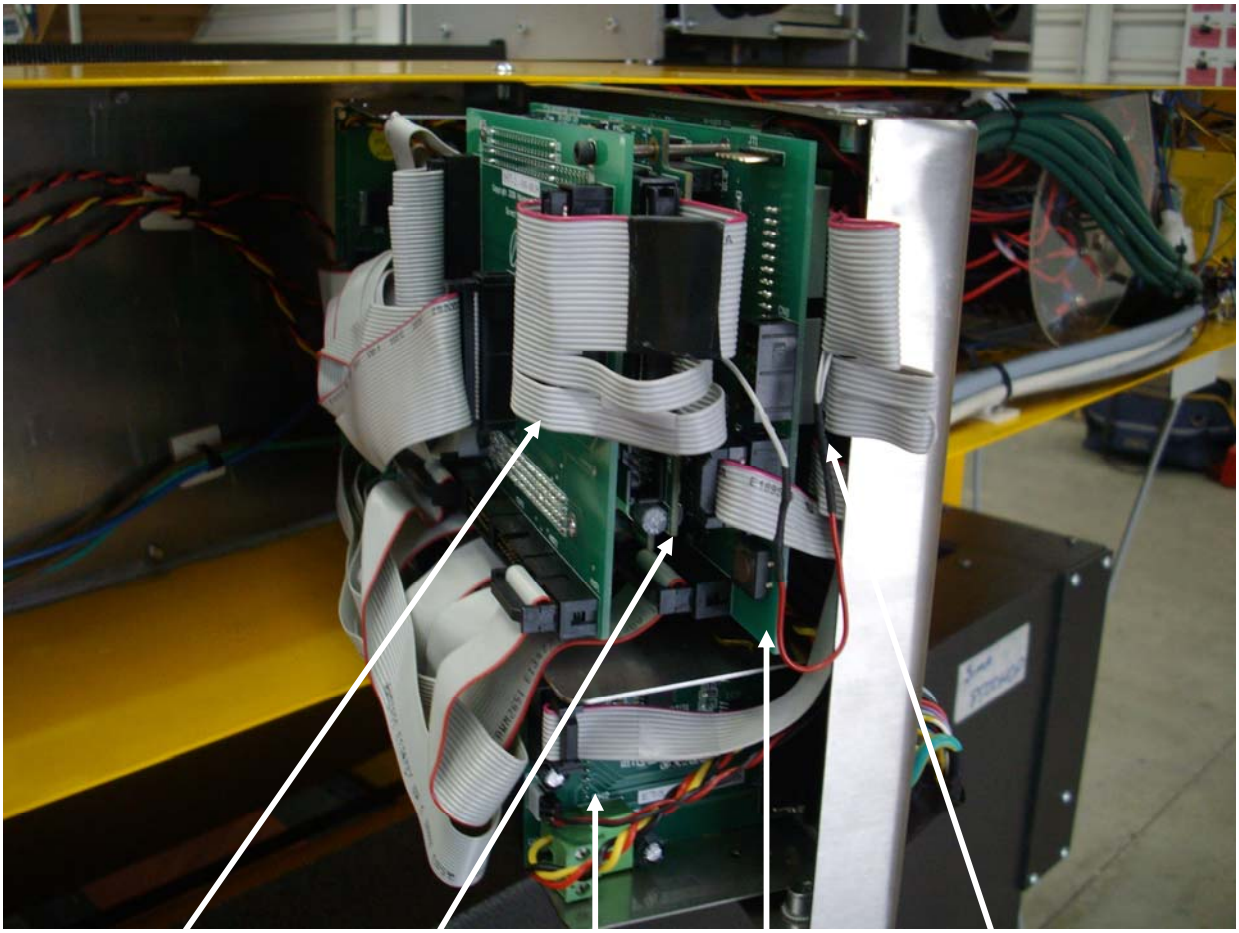






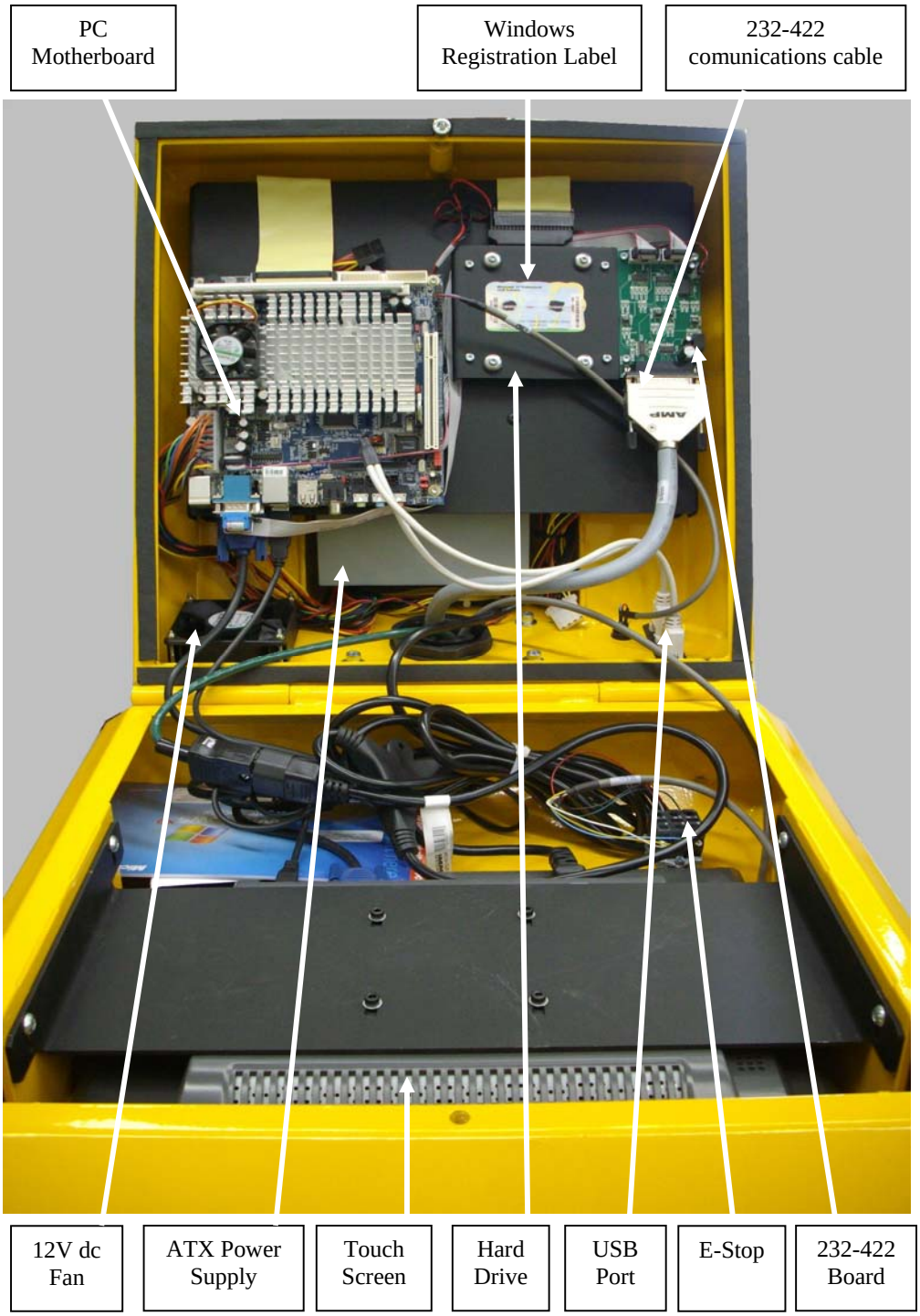

| Serial IO Interface Board | PWM Interface Board | 5-8 Extension Board | 232-422 IO Interface Board |
|---|---|---|---|

# PMAC MODULE SIDE

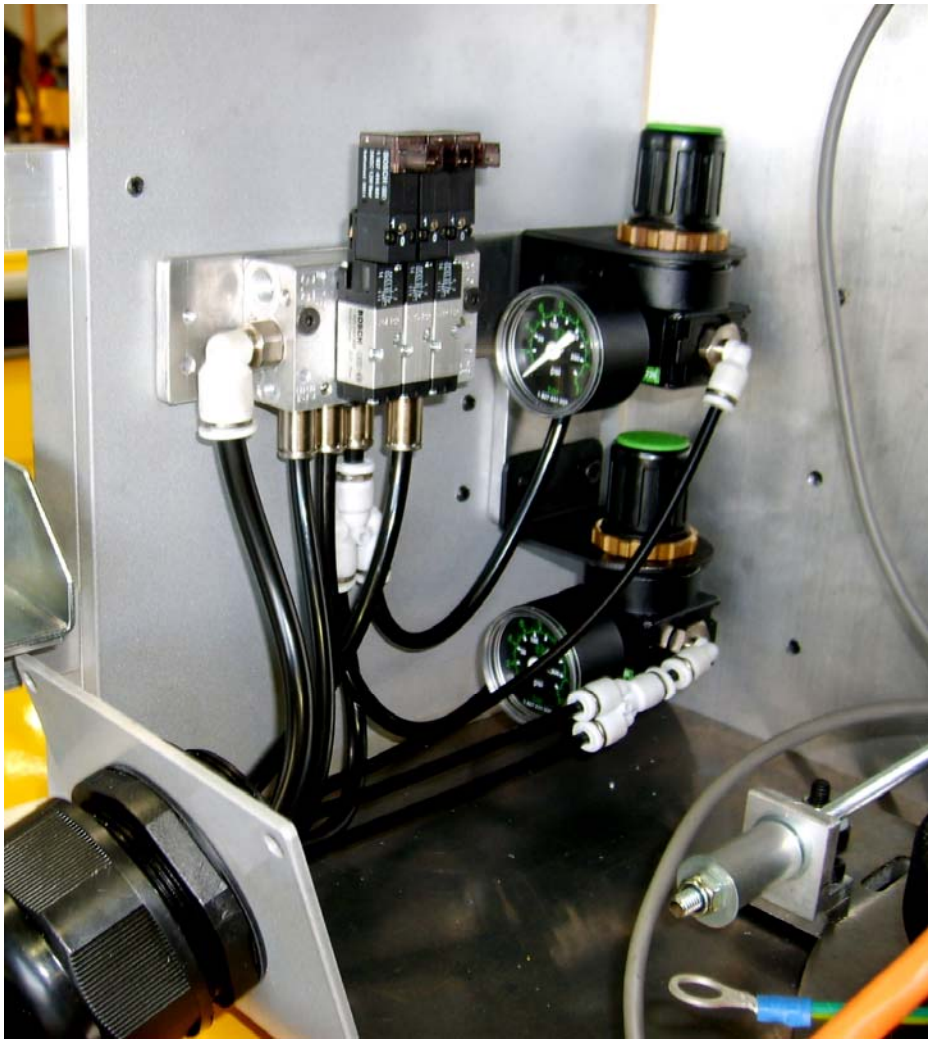


| Axis 5-8 Breakout | PMAC Axis 5-8 Expansion | RS422 Communication | FPGA Breakout Board | PMAC |
|---|---|---|---|---|

# TOUCH SCREEN COMPUTER

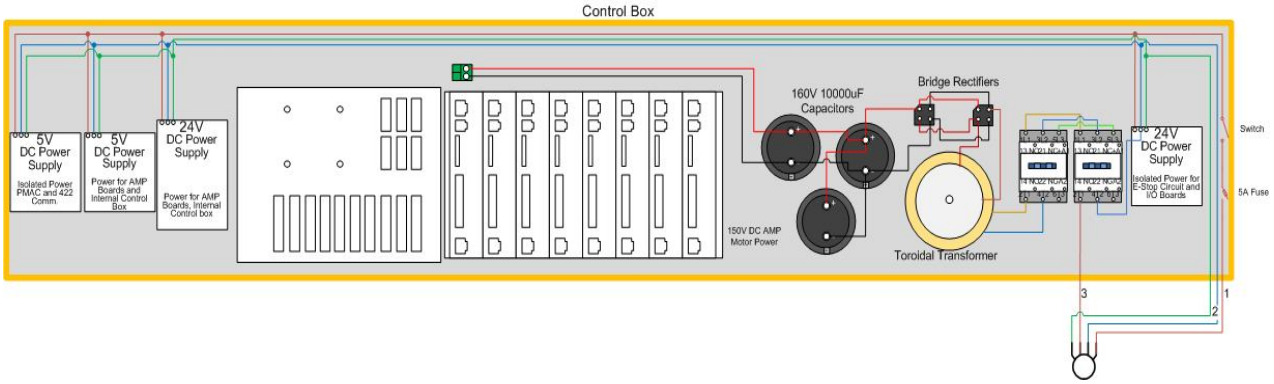


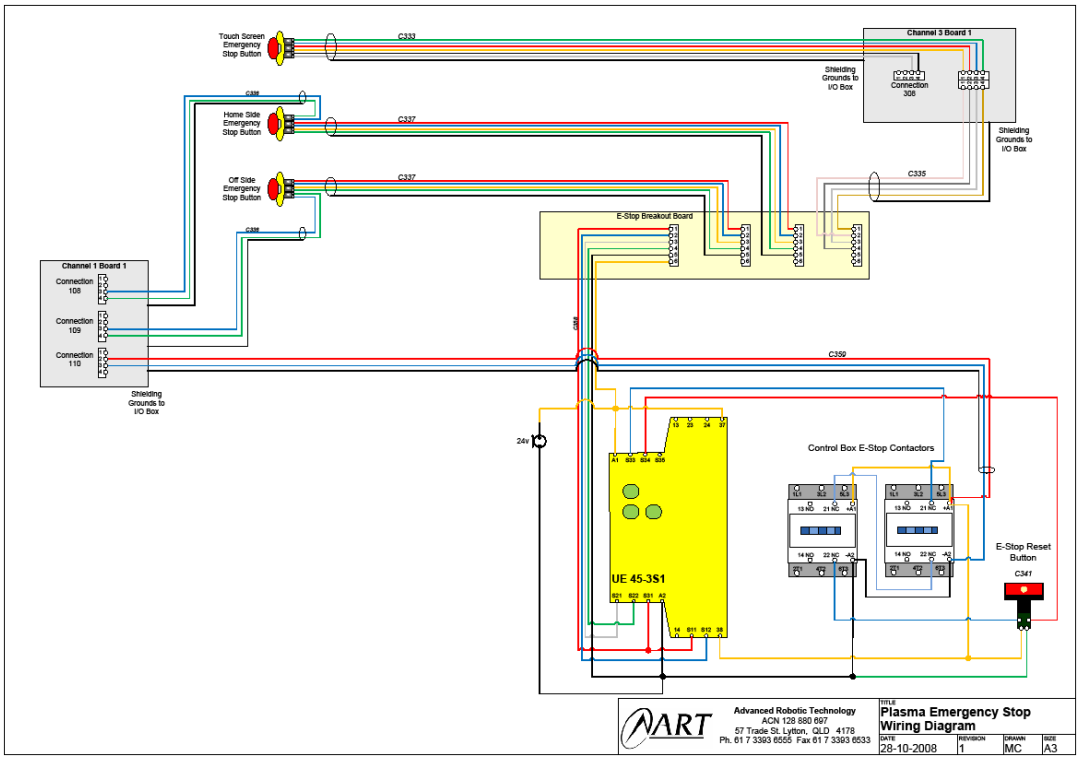
# AIR SOLENOIDS IN TOOL HEAD

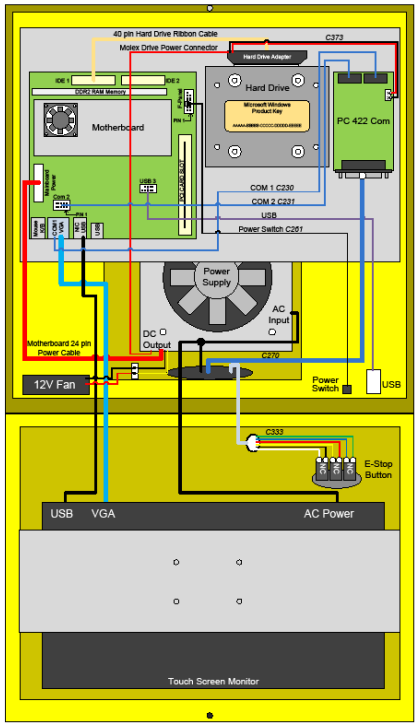


# CONTROL BOX MAINS WIRING

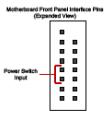
**Note: Each drawing will be A3 fold outs**




Touch Screen Emergency Stop Button
C333
Channel 3 Board 1
Shielding Grounds to I/O Box
Connection 308
C336
Home Side Emergency Stop Button
C337
Shielding Grounds to I/O Box
Off Side Emergency Stop Button
C337
C335
C336
E-Stop Breakout Board
Channel 1 Board 1
Connection 108
Connection 109
Connection 110
Shielding Grounds to I/O Box
C350
24v
Control Box E-Stop Contactors
UE 45-3S1
E-Stop Reset Button
C341
Advanced Robotic Technology
ACN 128 880 697
57 Trade St, Lytton, QLD 4178
Ph. 61 7 3393 6555 Fax 61 7 3393 6533
Plasma Emergency Stop Wiring Diagram
DATE 28-10-2008
REVISION 1
DRAWN MC
SIZE A3

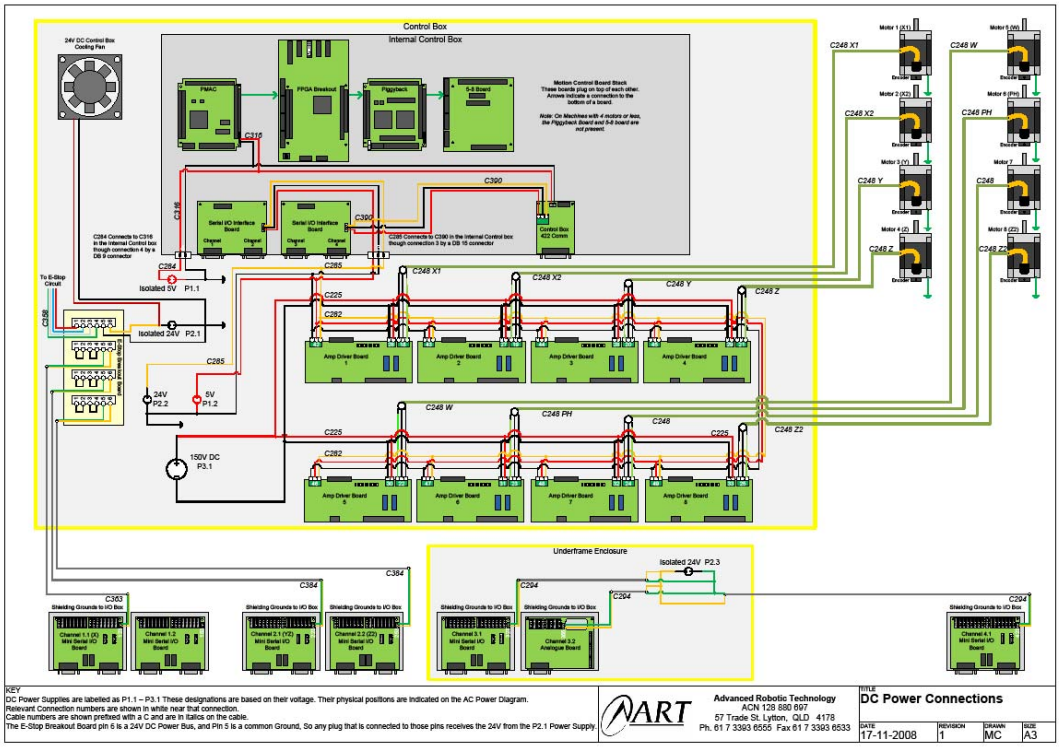



## Touch Screen Computer (Open)



The PC Power Supply has several DC outputs for specific Components.
The Fan plugs into a 4 pin Yellow and Black 12V connector.

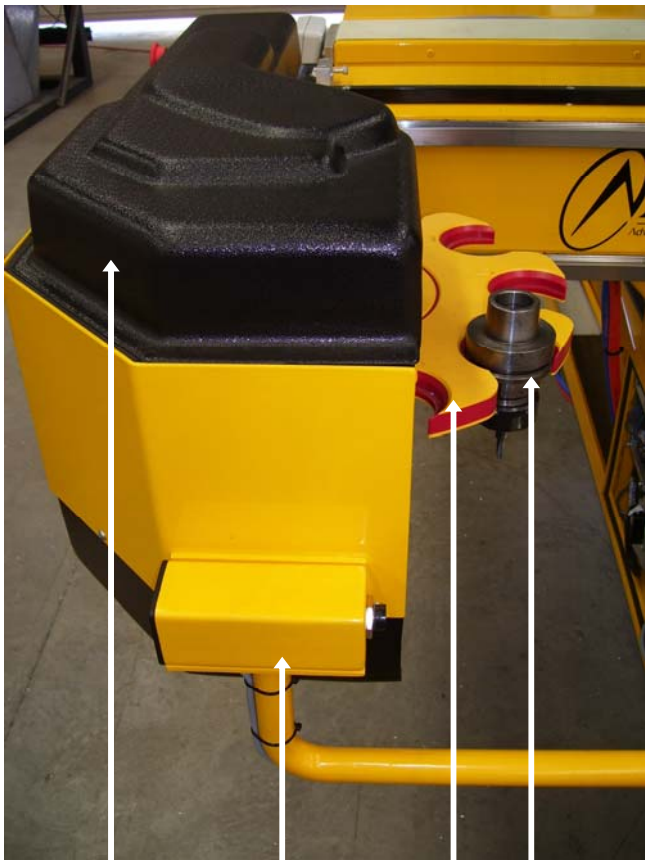
| | | | | |
|---|---|---|---|---|
| ART | Advanced Robotic Technology<br>ACN 128 880 697<br>57 Trade St, Lytton, QLD 4178<br>Ph. 61 7 3393 6555 Fax 61 7 3393 6533 | TITLE<br>Touch Screen Computer Connections | | |
| | | DATE<br>9-12-2008 | REVISION<br>1 | DRAWN<br>MC |
| | | | | SIZE<br>A3 |


Control Box
Internal Control Box
24V DC Control Box Cooling Fan
PMAC
FPGA Breakout
Piggyback
5-8 Board
Motion Control Board Stack
These boards plug on top of each other. Arrows indicate a connection to the bottom of a board.
Note: On Machines with 4 motors or less, the Piggyback Board and 5-8 board are not present.
C316
C390
C316
C390
C385
C384 Connects to C316 in the Internal Control box though connection 4 by a DB 9 connector
C385 Connects to C390 in the Internal Control box though connection 3 by a DB 15 connector
Serial I/O Interface Board
Control Box 422 Comm
C384
Isolated 5V P1.1
To E-Stop Circuit
C386
Isolated 24V P2.1
C285
24V P2.2
5V P1.2
150V DC P3.1
C248 X1
C248 X2
C248 Y
C248 Z
C225
C282
Amp Driver Board 1
Amp Driver Board 2
Amp Driver Board 3
Amp Driver Board 4
C248 W
C248 FH
C248
C248 Z2
Amp Driver Board 5
Amp Driver Board 6
Amp Driver Board 7
Amp Driver Board 8
Underframe Enclosure
Isolated 24V P2.3
C294
C384
C363
Shielding Grounds to I/O Box
Channel 1.1 (Z) Mini Serial I/O Board
Channel 1.2 Mini Serial I/O Board
Channel 2.1 (Y2) Mini Serial I/O Board
Channel 2.2 (Z2) Mini Serial I/O Board
Channel 3.1 Mini Serial I/O Board
Channel 3.2 Analogue Board
Channel 4.1 Mini Serial I/O Board
C248 X1
C248 X2
C248 Y
C248 Z
C248 W
C248 FH
C248
C248 Z2
KEY
DC Power Supplies are labelled as P1.1 – P3.1 These designations are based on their voltage. Their physical positions are indicated on the AC Power Diagram.
Relevant Connection numbers are shown in white near that connection.
Cable numbers are shown prefixed with a C and are in italics on the cable.
The E-Stop Breakout Board pin 6 is a 24V DC Power Bus, and Pin 5 is a common Ground, So any plug that is connected to those pins receives the 24V from the P2.1 Power Supply.
ART
Advanced Robotic Technology
ACN 128 880 697
57 Trade St. Lytton, QLD 4178
Ph. 61 7 3393 6555 Fax 61 7 3393 6533
TITLE
DC Power Connections
DATE 17-11-2008
REVISION 1
DRAWN MC
SIZE A3

**Machine Data connections Diagram**

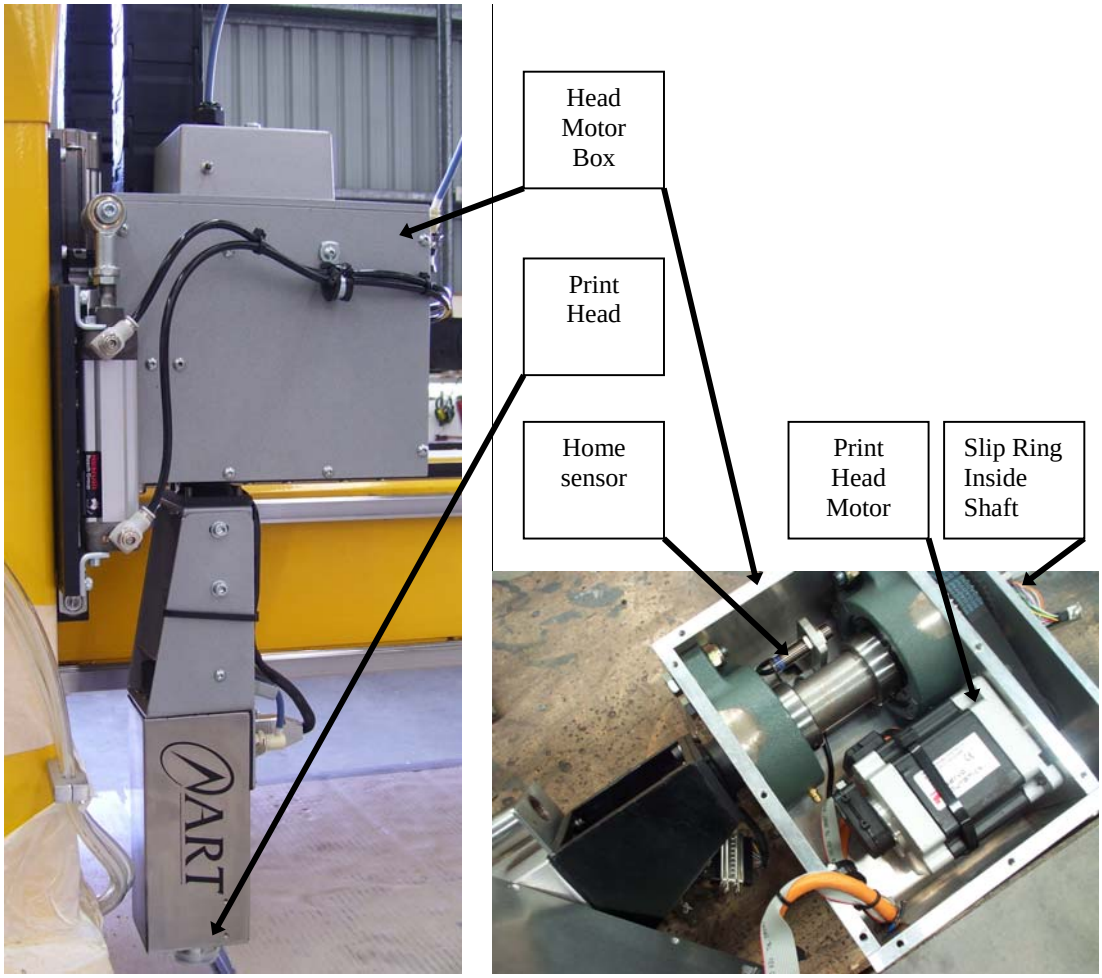
# *SECTION 4*

## 10 POSITION TOOL CHANGER OPTION

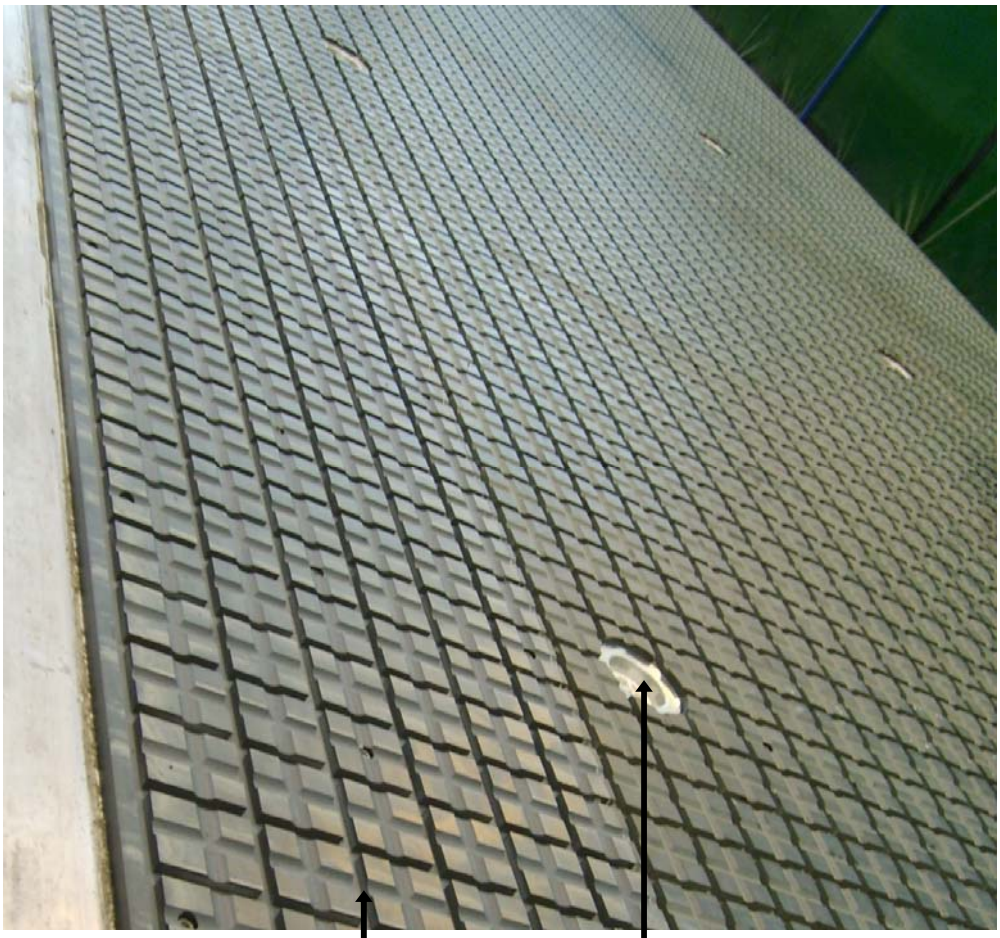


| Carousel Motor Cover | Light Curtain | Tool Carousel | Tool Holder |
|---|---|---|---|

# PRINTER OPTION




# VACUUM DECK OPTION



# VACUUM PUMP OPTION

Typical 4 pump Vacuum Set

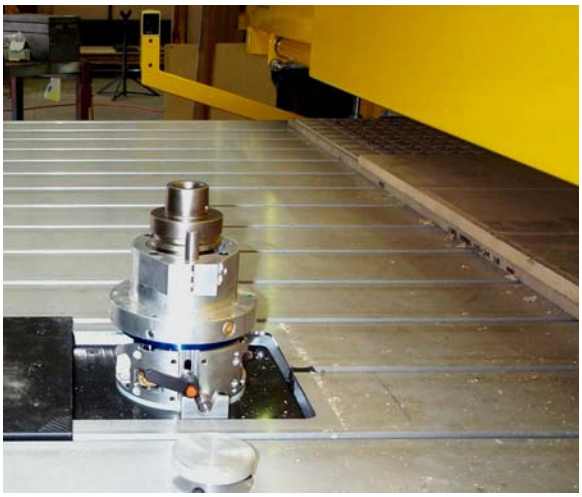
BUSCH
Mink MM11142BV
3 Phase 3 Kw
140 Meters Cubed/hour
60 mBars

Vacuum Pumps Under Cutting Table

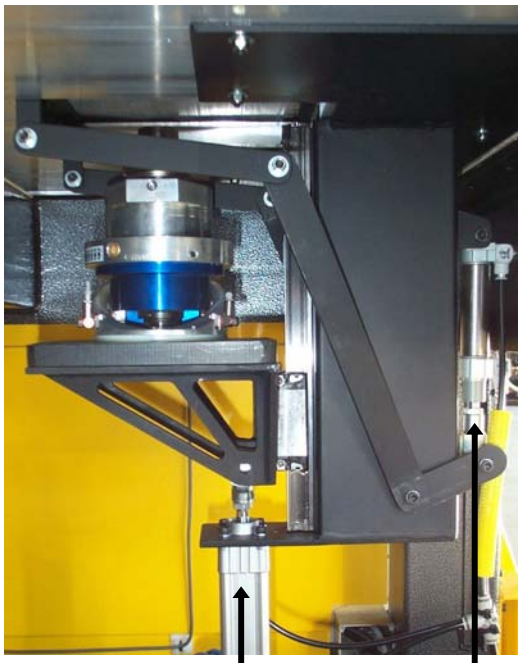
Vacuum Sector Valves

Vacuum Attachment Point

# RETRACTABLE SAW ATTACHMENT OPTION



Saw In Loading Position



Saw In Stow Position

Saw Lifter Cylinder

Trap Door cylinder

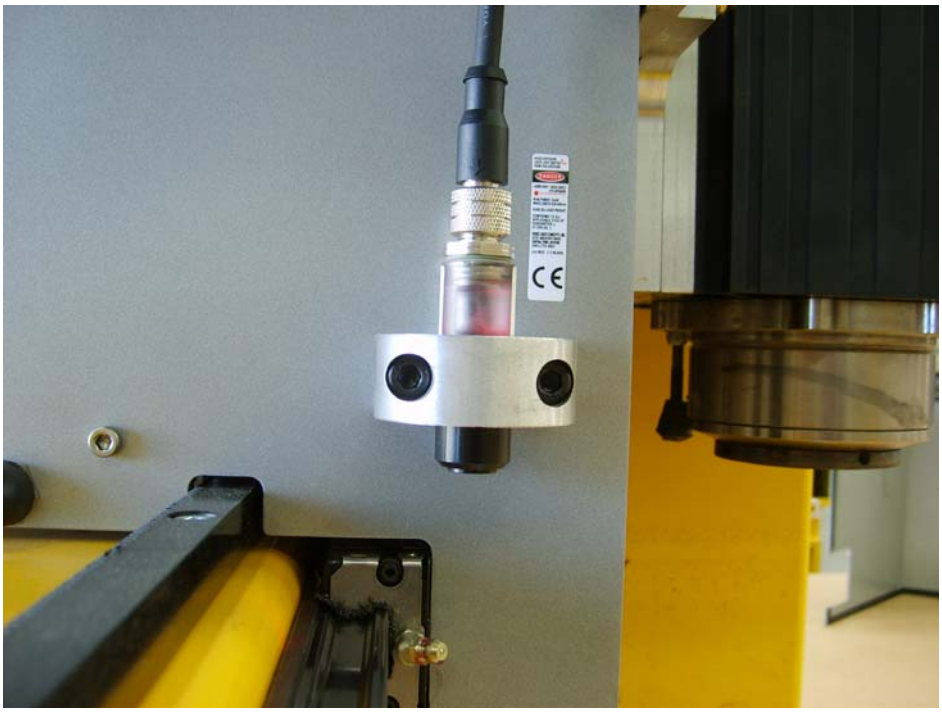
# VACUUM PLOUGH OPTION


Vacuum Plough Down

Vacuum Plough Lift Cylinder

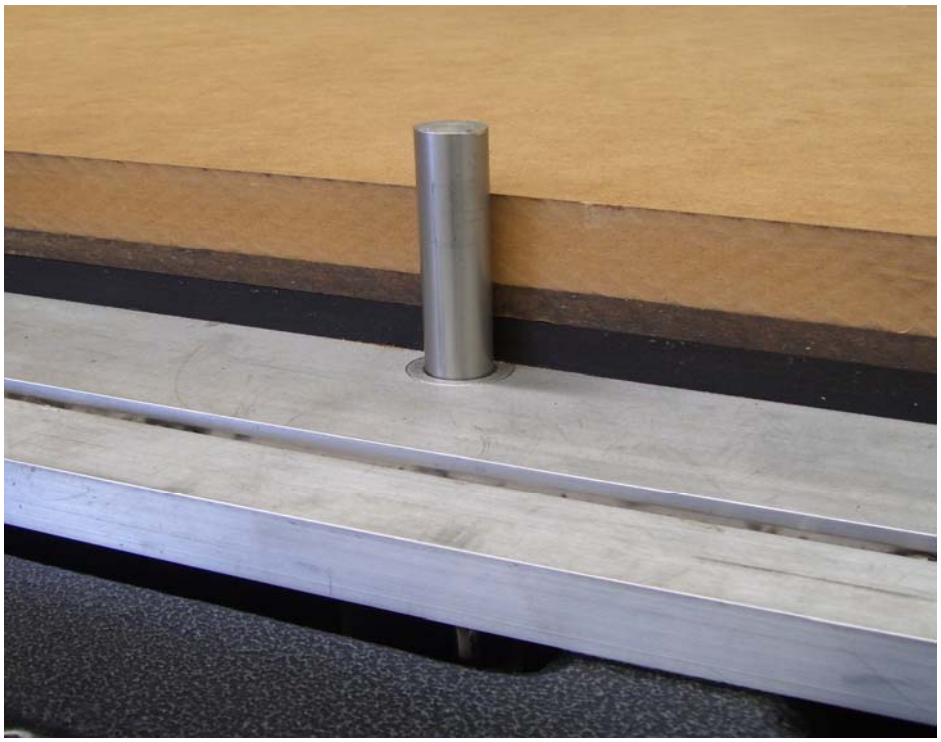
Bottom view

# ALIGNMENT LASER OPTION



Laser Selectable in
Tool Menu

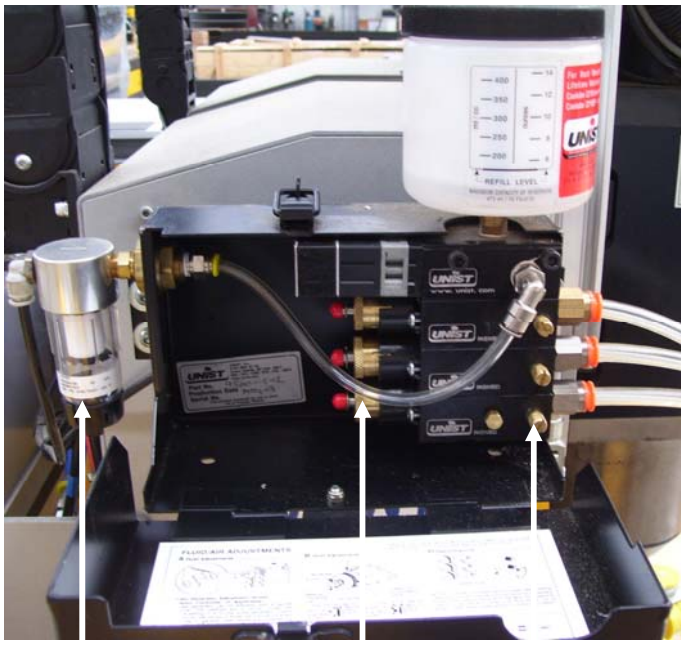
# POP UP ALIGNMENT POSTS OPTION



Pop ups Selectable From Profile
Shop Accessories Panel

# POP UP MATERIAL LIFTERS OPTION

# CUTTING FLUID MISTER



| Air Filter, Water Trap | Fluid Volume Adjustment | Air Flow Adjustment |
|---|---|---|

| Cutting Fluid Misting Nozzles | Dust Extractor Foot |
|---|---|

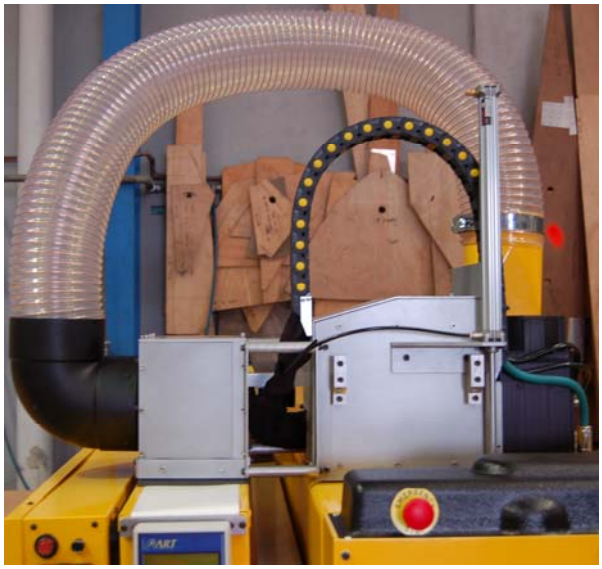
# DRILL AND TAP OPTION

| Tapping Head | Cutting Fluid Misting Nozzle | Drill Head |
|---|---|---|

# GANG DRILL OPTION


| Gang Drill Motor | Individually Retractable Drills |
|---|---|

# INTEGRATED DUST EXTRACTION SYSTEM



Dust Foot To Y Axis Extraction


Y Axis To X axis Dust Exchange

Dust Exit from End of Machine On X Axis

# 4 DRUM DUST EXTRACTOR

SF20103  10 HP  3200 CFM (1510 Liters per Sec)

# ROTARY VALVE OPTION

Rotary Valve for cleaner and easier waste collection
Fits between outlet and drums on the 4 drum extractor
3 Phase 1amp

# 2 BAG DUST EXTRACTOR


| |
|---|
| SF 005 5 HP 3 Phase 7.4 Amps |

Advanced Robotic Technology

# SPINDLE WATER COOLER

TURMOIL
DIN FJ32ZU-N-N-106
Single Phase 240volt 10 Amps
0 to 49 degrees centigrade

# SPINDLE OPTIONS

COLOMBO
RS110
7.5 KW
24000 RPM
Fan Cooled

COLOMBO
RS120
10 KW
24000 RPM
Fan Cooled


COLOMBO
RS135
11.8 KW
24000 RPM
Water Cooled

# DIVIDING HEAD ROTATIONAL AXIS

# 4 DIRECTIONAL AIR JETS

Directional Air Jets Force Waste Out Of Cut Grooves In The Direction Of Cutting Movement

Advanced Robotic Technology

# *APPENDIX A*

## NON CONFORMANCE REPORTS

*Explanation*

The NCR system has been introduced  to maintain the high quality and standard of our machines. A Non Conformance Report or NCR, is a form of reporting if your machine is not operating as expected. If this should occur the following steps should occur.

This system is a vital part of ART's quality systems, allowing you to get maximum efficiency from your machine. You will also benefit from the ongoing research and development and trouble shooting.

Please visit www.advancedrobotic.com then log into the client login with your unique username and password. From there navigate to "View my NCRs" and create a new NCR and enter the details of the problem.
Please provide your observation of any unusual behavior of the machine and report as much information as you can regarding any problems.